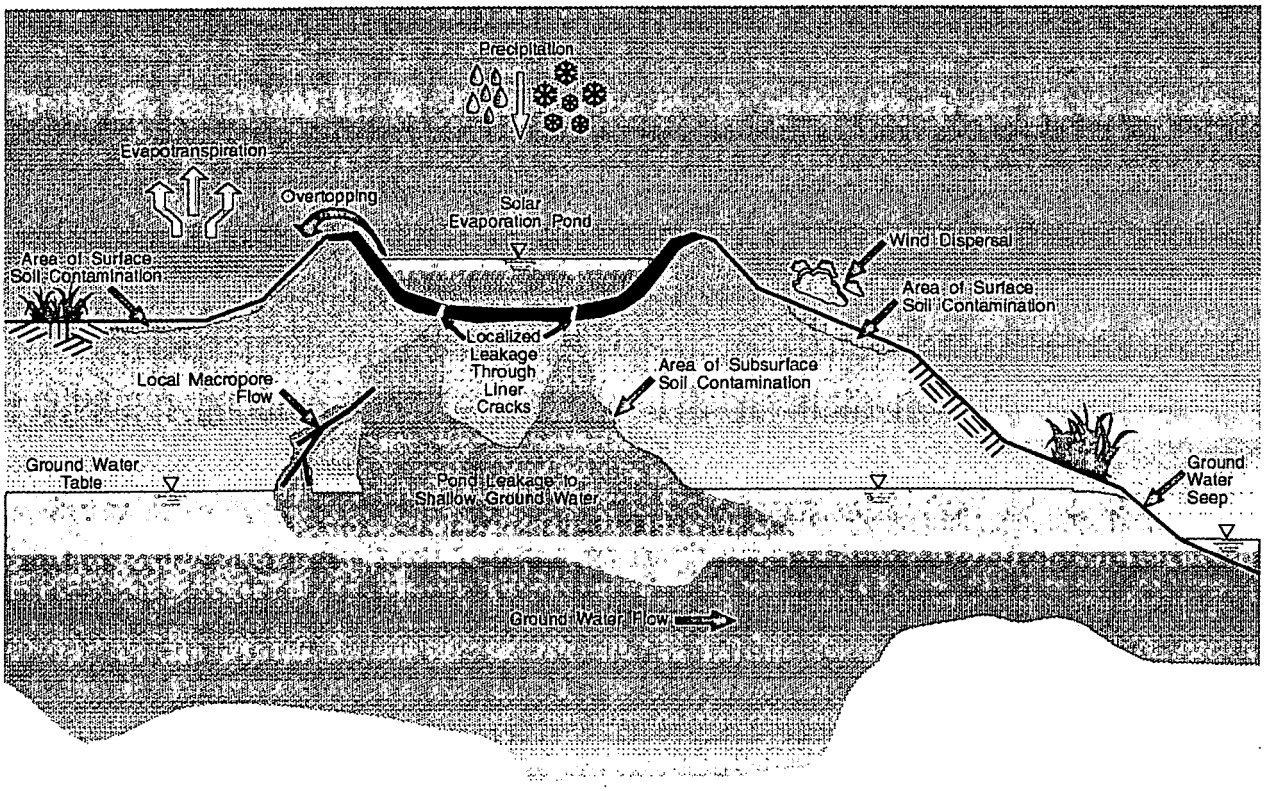
OU4 Interim Measure/Interim Remedial Action Environmental Assessment Decision Document

Part II - Phase I RCRA Facility Investigation/Remedial Investigation Report

Summary



Part II Summary

Part II of the IM/IRA-EA Decision Document provides the results of the Phase I RCRA Facility Investigation/Remedial Investigation (RFI/RI) report to characterize the constituents at OU4 and establish the nature and extent of the contamination within OU4. Historic sources of contaminants at OU4 have been liquids and sludges disposed of in the Solar Evaporation Ponds (Ponds). These liquids and sludges have entered the subsurface and may continue to be a source of contaminants beneath the Ponds. The Ponds received wastes including low-level radioactive

process wastes containing high nitrate concentrations, neutralized acidic wastes containing aluminum hydroxide, and additional wastes containing sanitary sewage sludge, lithium metal, sodium nitrate, ferric chloride, lithium chloride, sulfuric acid, ammonium persulfates, hydrochloric and nitric acids, hexavalent chromium, and cyanide solutions. No solvents or other organics were reported as routine components of the waste stream that were discharged to the Ponds.

The Part II presents the activities that were conducted in the field to collect samples for constituent analysis. Samples were collected from the Pond liners, surface soils, subsurface soils (vadose zone), and bedrock beneath and in the vicinity of the Ponds. Seventy-two surficial soils samples were collected. Forty-eight boreholes were drilled and sampled during the Phase I RFI/RI. The field investigation was designed to evaluate the potential for the Ponds to act as continuing sources of contaminants, and to evaluate whether contaminants are present in the subsurface soils.

Samples were collected and sent to qualified laboratories for chemical analysis with respect to the constituents known to be in the wastestream, as well as constituents that are known contaminants at the Rocky Flats Environmental Technology Site (RFETS). The results of the OU4 sampling and analysis activities were statistically compared to background constituent concentrations resulting from sampling and analysis in the RFETS buffer zone. The results of this assessment indicate that OU4 has elevated concentrations of numerous constituents. The results of these analyses are presented in tables and the constituent concentrations that were elevated with respect to background are posted on site maps for a visual depiction of the extent of contamination. Elevated constituents included metals, radionuclides, and organic compounds. These elevated constituents were labeled Potential Contaminants of Concern (PCOCs). Table 1 provides a list of the surficial soil PCOCs. Table 2 provides a list of the subsurface soil PCOCs.

The PCOCs were determined to be distributed in surface soils adjacent to the Ponds as well as soils located on the hillside north of the Ponds. These soils may have been primarily contaminated by surface spills, pond overtopping, deposition by wind-blown aerosols derived from the ponds, residual debris remaining after pond repair and decommissioning, discharge of drain lines, and contaminated ground water seepage to the north hillside. PCOCs detected in the subsurface soils are similar to those found in the surface soils. The distribution of the contaminants in the subsurface soils are generally concentrated beneath the Ponds. Release of PCOCs to the subsurface soils occurred primarily by leakage from the Ponds to the subsurface. The irregular distribution pattern of contaminants in the subsurface soils suggests that migration occurred primarily as vertical infiltration in areas of pond liner breaches, overtopping areas, and possibly pipeline releases. The PCOCs identified in the Phase I RFI/RI report are analyzed with respect to their potential to cause an unacceptable risk in Part III of the IM/IRA-EA Decision Document. PCOCs that contribute an unacceptable risk become the OU4 contaminants of concern (COCs).

TABLE 1
LIST OF THE OU4 POTENTIAL CONTAMINANTS OF CONCERN IN SURFACE SOILS

Radionuclides	Metals/Inorganics	Organics
Americium-241	Beryllium	Benzo(a)anthracene
Cesium-134	Cadmium	Benzo(a)pyrene
Gross alpha	Calcium	Benzo(b)fluoranthene
Plutonium-239,240	Mercury	Benzo(ghi)prylene
Tritium	Nitrate/Nitrite	Benzo(k)fluorathene
Uranium-233,234	Silicon	Bis(2-ethylhexyl)phthalate
Uranium-235	Silver	Chrysene
Uranium-238	Sodium	Di-n-butyl phthalate
		Fluoranthene
		Indeno(1,2,3-cd)pyrene
		Phenanthrene
		Pyrene
		Aroclor-1254

TABLE 2
LIST OF THE OU4 POTENTIAL CONTAMINANTS OF CONCERN IN SUBSURFACE SOILS

Radionuclides	Metals/Inorganics	Organics
Americium-241	Barium	2-Butanone
Cesium-134	Cadmium	Acetone
Cesium-137	Calcium	Bis(2-ethylhexyl)phthalate
Gross beta	Lithium	Chloroform
Plutonium-239,240	Manganese	Di-n-butyl phthalate
Radium-226	Nitrate/Nitrite	Methylene chloride
Strontium-89,90	Potassium	Toluene
Tritium	Sodium	Cyanide
Uranium-233,234	Sulfide	
Uranium-235	Zinc	
Uranium-238		